

Japanese Patent Laid-Open Publication No. 1-312736

Publication Date December 18, 1989
Application No. 63-143407
Application Date June 10, 1988
Applicant Nihon Columbia Kabushiki Kaisha
Inventor Hirohito SAKUMA

Excerpt from line 11, the lower-right column of Page (5) to
line 1, the upper-left column of Page (7)

The operation of Fig. 1 will be explained below.

A reproduction signal from the optical head (1) is provided to the signal detection circuit (2), which signal detection circuit (2) separates the signal to a track error signal a and an HF signal b and provides such signals to a track error detection circuit (3) and an HF signal detection circuit (5), respectively. When the track error signal is equal to or greater than a predetermined value, the track error detection circuit (3) outputs a track error detected output signal (c). Fig. 2 shows one example of the track error detection circuit (3) configured by a window comparator (3a) and an integrating detection circuit (3b). The track error signal a is provided to the window comparator (3a), to which window comparator (3a), \pm reference voltages, +REF and -REF are applied, and a track signal a' equal to or greater than such reference voltage is extracted, that is, as shown in Fig. 3A, with regards to the track error signal a and with the \pm reference voltage \pm REF as the threshold level, the pulse a' equal to or greater than the reference voltage is extracted from the window comparator (3a), as shown in Fig. 3B. The voltage pulse a'

is integrated in the integrating detection circuit (3b) and the track error detected signal c is extracted, as shown in Fig. 3C. Here, the reference voltage is preferably less than the maximum level of the track error signal of when the light beam is displaced in the track direction. Thus, even if the track is shifted by an external vibration, the track error can be immediately detected. The integrating detection circuit (3b) is not essential in this case, but by arranging the integrating detection circuit (3b), the noise having a particularly short pulse is not detected, and signals faster than the set traveling speed of the beam is eliminated, thus the S/N can be improved. By using such track error detection circuit (3), the probability that the track error detected during writing is an error becomes high. The track error detected signal c is provided to the setting terminal of the flip-flop circuit (4), and with the /Q output of the flip-flop circuit (4), the recording from the optical head (1) to the optical disc through the gate circuit (16) → read address counter (12) → buffer memory (10) → recording amplifier (15) is stopped, as mentioned above, and at the same time the recorded/unrecorded part change-point detection circuit (18) is activated. Simultaneously, to search for the track to be recorded that is thought to be lost by the track error, an address number indicating the track position from where the track error detected signal of the track error detection circuit (3) is output is set to a recording error address number set circuit (20). The address number of when the track error occurred is provided to an address comparator circuit (22a) by way of the gate circuit (23). The HF signal from the HF signal detection circuit (5) is provided to a track search circuit (6), and an address number decoded from the HF signal is provided to the address comparator circuit (22a)

and compared with the address number of when the track error occurred. The comparison output is provided to the track search circuit (6) and operates a kick circuit (7) until the address numbers match. The operation of the kick circuit (7) will now be explained with reference to the optical disc track of Fig. 4. Assuming a continuous signal is recorded to the track of Fig. 4, if a track error occurs by dust, external vibration and the like when the spot SP of the optical head (1) moves over the tracks T_2 - T_3 and reaches a P point, the spot SP is jumped to track T_5 shown with a spot point P_1 , and recording after reaching the P point on the track T_3 is stopped right before the jump and enters a reproduction state. Here, since the track T_5 to where the spot point P_1 is brought is an unrecorded part, the HF signal is not detected from the HF signal detection circuit (5), and when one kick pulse is output from the track search circuit (6) towards the recording start track side of the optical disc, the kick pulse returns the spot SP of the optical head (1) to track T_4 on the recording start track side by one track by way of the kick circuit (7). Since the HF signal is not detected from the HF signal detection circuit (5) even in this state, the spot SP returns successively from T_4 to T_3 one track at a time and when the spot SP reaches point P_2 , the HF signal is detected at the HF signal detection circuit (5) since information is recorded on track T_2 . Since track T_2 is in the reproduction state, the spot at spot point P_2 returns back to the P point by way of tracks T_2 and T_3 . This P point is detected by the recorded/unrecorded part change-point detection circuit (18), which outputs a reset pulse to the flip-flop circuit (4) to reset the flip-flop circuit (4) and clear the recording error address number set circuit (20), and at the same time opens the gate circuit (16) and starts recording

from the P point.

In the example of Fig. 4, an example in which the spot SP is moved to the unrecorded track side by the track error is explained, but when moved towards the recorded side, that is, when moved in a direction of tracks $T_3 - T_2$ on the recording start side for some reason, the kick circuit (7) is controlled in the direction opposite (unrecorded track side) to that described above, and the spot point P of the re-recording start position is detected.